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by Maria Mangano

Centre for Research in Applied Economics,
School of Economics and Finance
Curtin Business School
Curtin University of Technology
GPO Box U1987, Perth WA 6845 AUSTRALIA
Email: michelle.twigger@cbs.curtin.edu.au
Web: <http://www.cbs.curtin.edu.au/crae>
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Cost-shifting of dialysis treatment in Western Australia: Winners and losers

by

Maria Mangano*

Abstract

The process of cost-shifting occurs when surplus revenues from one set of services are used to subsidise another set of services or patient group. In Western Australia the call for increased home dialysis in order to reduce the pressure on the WA health system has been suggested to reduce the burden on hospitals. However, when consideration is given to the increased probability of PD peritonitis (especially among the indigenous population), it is possible that hospitalisation rates may increase, offsetting some of the reduced burden. The privatisation of home dialysis in 2006 created divided treatment regimes for dialysis patients such that this group is disadvantaged when they require hospitalisation for any reason, due to the privatisation of PD nurses and resources. Cost-shifting creates winners and losers, therefore, because it will increase rents to the private company that is the monopoly provider of home dialysis equipment and consumables, while reducing the quality of overall care for PD patients in hospitals.

*School of Economics & Finance
Curtin University of Technology
Kent Street
Bentley WA 6102
Australia

Phone: +61 8 9266 2842

Fax: +61 8 9266 3026

Maria.Mangano@cbs.curtin.edu.au

Introduction

Due to the author's personal experience with dialysis treatment in Western Australia, and in response to a recent media release (Prior, 6 October, 2009), there is growing concern over the future of dialysis provision in this State. Prior (2009) reports that 'A leading WA renal health expert has recommended an increase in home dialysis treatment to relieve the growing pressure on the WA health system from a steadily rising problem of kidney disease'. The report goes on to say that, according to the chairman of the renal clinical network at the Department of Health, Dr Ashley Irish, one of the biggest burdens on dialysis patients is the travel to and from treatment, and he cites recent statistics reporting an 8% rise in dialysis patients nationwide between 2007 and 2008. Home dialysis patients currently make up 25% of total dialysis patients in Western Australia. Dr Irish claims that an increase in this proportion to 33% will help alleviate the burden on hospital resources, '...therefore costing the system less' (Prior, 2009).

This paper argues that cost-shifting of this type will result in a reduction in consumer surplus, with a relatively small, or no improvement in hospital expenditures. In 2006 all provision of home peritoneal dialysis (PD) and home haemodialysis (HD) was outsourced by the State Government by Public Private Partnership (PPP) with a private provider. This provider is a multinational company with origins in Germany and with previously reported fraudulent activity in the United States¹. The PPP allows the multinational to provide home dialysis care to public patients following patient referral from specialist renal practitioners. Consequently, the greater benefits of an increase in home dialysis will accrue to the private monopoly provider of home dialysis equipment, consumables and nursing staff. Costs for home dialysis are covered by Medicare with no gap payment or deductible payable. Taking into account the likely increased incidence of hospitalisation and/or visits to primary care providers due to PD peritonitis and associated treatment, it is not anticipated that an increase in home dialysis will cost the system less overall. Furthermore, given the disproportionately high level of indigenous patients currently requiring relocation for HD treatment, it is unlikely, for reasons that will be explained, that the majority of this group satisfy the criteria to be considered good candidates for home dialysis referral. Savings could be achieved,

¹ For a description of the out-of court criminal and civil fraud settlement, see the section on renal dialysis at University of Wollongong Professor Brian Martin's website at <http://www.uow.edu.au/~bmartin/dissent/documents/health/>

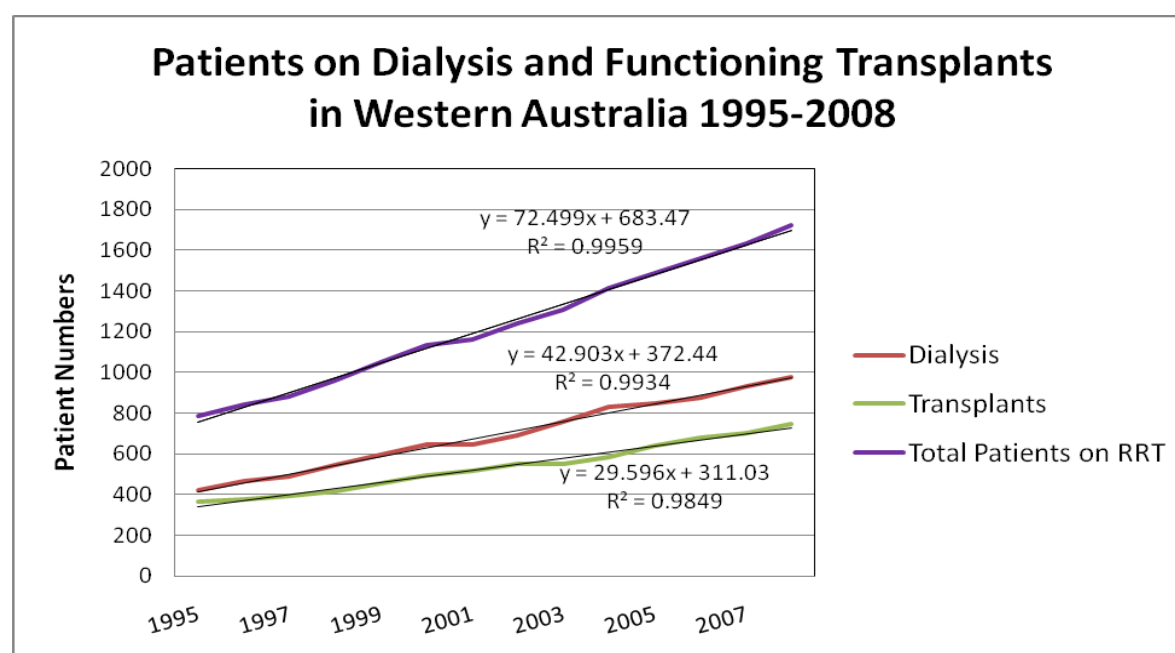
however, with an increase in kidney transplants among indigenous patients who clinically qualify.

This paper begins with a description of the treatment and cost comparisons for end-stage kidney disease, followed by patient composition of dialysis treatment in WA, and the imminent issues for Indigenous and non-indigenous patients. Concluding remarks also provide comments on direction of future research.

Treatment and Cost Comparisons for End Stage Kidney Disease (ESKD)

Patients with ESKD have increased in number over time in Australia. As at December 2007 16,770 people were receiving renal replacement therapy (RRT) in the form of either regular dialysis (9,642), or with a functioning kidney transplant (7,128). Between 2000 and 2007 the number of new patients commencing RRT increased from 1,751 to 2,311, a 24% increase (AIHW, May 2009). Figure 1 plots patient numbers on dialysis and functioning transplants from 1995 to 2008 in Western Australia. From this graph in Western Australia the number receiving dialysis treatment has increased between 1995 and 2008 at the rate of approximately 43 patients per annum². Over the same period the number of patients receiving functioning transplants increased at the rate of approximately 29 patients per annum³ (ANZDATA, 2009).

Fig. 1



Source: Australia and New Zealand Dialysis and Transplant Registry, Appendix 1, 2009.

² Calculated by fitting a linear trendline to data with $R^2 = 0.9934$.

³ Calculated by fitting a linear trendline to data with $R^2 = 0.9849$.

Figure 1 confirms that patient numbers on dialysis are rising faster than those receiving transplants. The numbers on dialysis rose by 132% over the 14 year period, and the number of transplants doubled. This is a clear indication of the rate of growth in demand for RRT and therefore the growing need for its increased funding. Costs are not identical however for the different dialysis modes and locations as they are for kidney transplants (surgery and ongoing drug therapy).

HD treatment is the more common mode of dialysis, and can be undertaken in the three West Australian public teaching hospitals with renal wards; Fremantle Hospital, Royal Perth Hospital and Sir Charles Gairdner Hospital. On average, patients attend these hospitals three times per week for between 4 and 6 hours each time. The vast majority of HD patients, however, attend satellite HD centres to which many have relocated from regional centres. These satellite HD centres in both metropolitan and rural areas can be found in Albany, Armadale, Bunbury, Busselton, Geraldton, Joondalup, Kalgoorlie, Melville, Midland, Peel, Derby, Kimberley, Port Hedland, Royal Perth Rehabilitation Centre, Cannington and Stirling (ANZDATA, 2009). All HD is supervised by specialist renal nursing staff with the exception of a small percentage of patients who undergo self-administered HD in the home. Home HD requires a dedicated room to house equipment, and the assistance of a partner or family member to help with administering treatment. Some patients are not suitable candidates for HD where, for example, their arteries have been compromised making it impossible to implant a functioning fistula. These patients may be referred for PD.

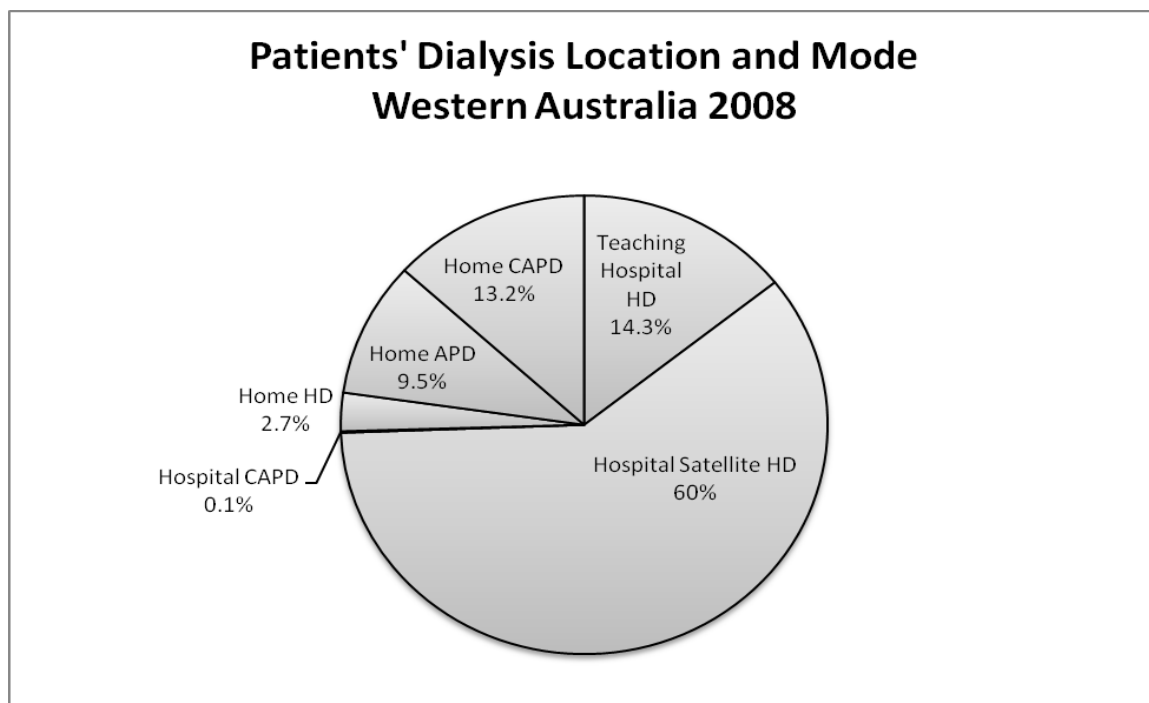
PD is another mode of dialysis with the same objective as HD in that it removes toxins and excess fluid from the bloodstream as a substitute for normal kidney function. PD requires the surgical implant of a catheter directly into the peritoneum cavity, two months after which dialysis may begin. There are two types of PD, namely continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD), both of which are self-administered daily or nightly in the home and unsupervised by medical staff. CAPD is a manual system where the patient connects and disconnects (an exchange occurs) approximately four times per day in order to effect treatment. An exchange begins with the patient draining dialysis fluid⁴ from the previous day into an enclosed drain bag. The patient then switches to inflow (initially to the drain for 3 seconds to remove air from the line) directly into the catheter. Once that the 2 litres of fluid has flowed to the patient, the catheter can be removed from the manual set and capped, leaving the patient free to move around for

⁴ A sugar-based liquid that draws toxins from the bloodstream through the osmosis method.

between 2 and 3 hours. During this time the dialysis fluid dwells in the peritoneum drawing toxins and excess fluid from the bloodstream. APD treatment is achieved with the aid of a computer/machine designed to utilise software that is programmed according to medical prescription and is password protected. This system is administered nightly with the patient connected and while they are asleep in bed. During the night the program chosen pumps dialysis fluid on pre-determined time cycles with fluid volumes according to prescription. In the morning the patient disconnects from the machine at the end of their nightly program (between 7 and 8 hours) leaving them free to have an unhindered routine during the day.

Strict sterilisation protocols for maintaining the integrity of the catheter and the exit site are provided to patients and/or their carers in the form of training prior to home dialysis taking place unsupervised. This is necessary due to the risk of contracting PD peritonitis in the course of regular treatment. Unsupervised home dialysis makes up a smaller proportion of total dialysis due to these strict protocols and requirement for general cleanliness of the home environment, as well as the pre-assessed medical suitability of this option. Figure 2 shows the percentage breakdown of dialysis patients by location and mode in Western Australia in 2008.

Fig. 2



Source: Australia and New Zealand Dialysis and Transplant Registry, Appendix 1, 2009.

Figure 2 shows that 60% of dialysis patients in Western Australia receive HD treatment in satellite centres, with another 14.3% receiving HD treatment in the three teaching hospitals. Home dialysis is dominated by patients on PD, the largest proportion of which is 13.2% on CAPD. A further 9.5% utilise the nocturnal method of APD, and 2.7% of patients undertake unsupervised HD in the home. On the face of it, therefore, it appears that significant reductions in satellite HD could be achieved if many of these patients were to adopt either PD or HD in the home, as per the suggestion made by Dr Irish. A cost comparison of each dialysis mode provides information as to the possible savings that could be achieved with such cost-shifting.

The Australian Institute of Health and Welfare has estimated health care expenditure on chronic kidney disease in Australia for the 2004-05 year based on the ANZ data registry and Victorian Department of Human Services' estimates (AIHW, 2009). The report cites Cass et al. (2006) who estimate the cost of a kidney transplant (including drug therapy). These estimated costs are assembled and presented in Table 1.

Table 1: Estimated average expenditure on dialysis treatment and kidney transplant, Australia, 2004-05

Dialysis Modality	Average expenditure per patient per year (\$)
HD in hospital or satellite centre	75,660
HD at home	64,330
CAPD	50,362
APD	50,362
Transplant	31,500 (surgery) + 31,500 (drug therapy in year 1) + 10,000 (drug therapy for each subsequent year of life)

Source: AIHW, Health care expenditure on chronic kidney disease in Australia, September 2009 [Available online].

The expenditure estimates in Table 1 support the view that cost savings could be achieved with an increase in home dialysis because both CAPD and APD cost significantly less than hospital HD. CAPD and APD are each costed at \$50,362 per patient per annum. This compares with hospital and satellite centre HD estimated at \$75,660 per patient per annum, or 33.5% greater than home dialysis. Of note, however, is the cost of transplants with

ongoing drug therapy. Initial surgery is costed at \$31,500 with drug therapy in the first year equivalent to that amount. Drug therapy in subsequent years is costed at approximately \$10,000. Over time, therefore, transplant surgery is clearly the best option for lowering health care expenditure on ESKD. The cost estimates in the AIHW's report do not include capital expenditure or indirect costs such as lost earnings and productivity, loss of tax revenue, provision of unemployment or disability benefits, costs of travelling for treatment, or the social and economic burden on carers and family (AIHW, 2009, p 2). These indirect costs would be considerable in the case of all types of dialysis treatment.

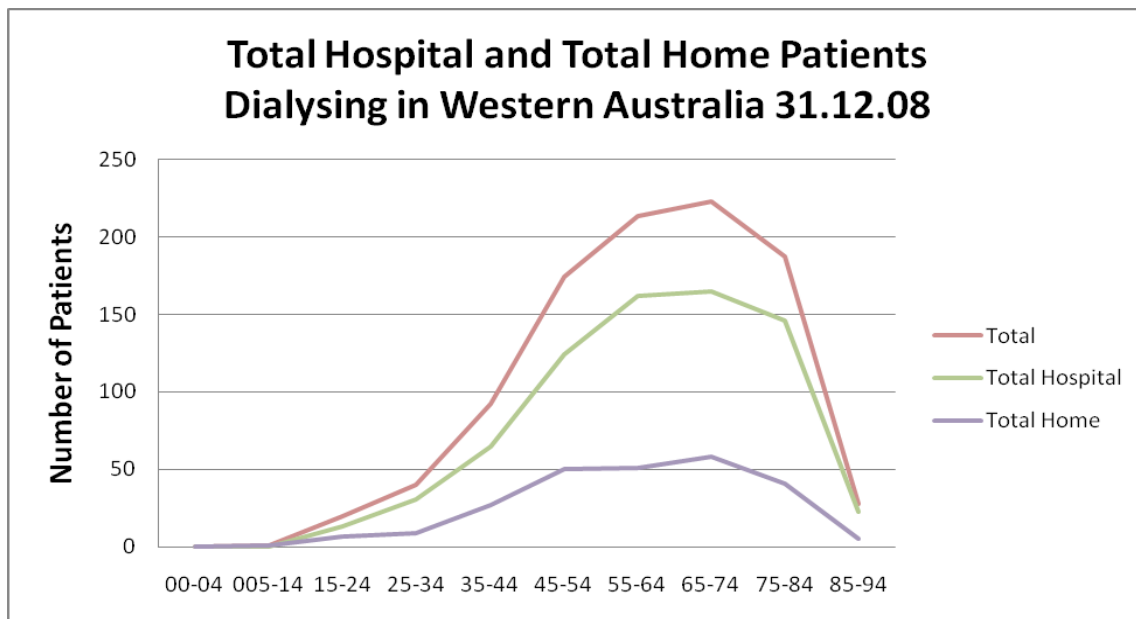
Patient Composition

As set out in Figure 1 there is a steadily rising problem of kidney disease in Western Australia. Much of this increase is due to the rise in lifestyle-type problems of obesity and over-consumption of addictive substances such as tobacco and alcohol⁵. Many lifestyle-type problems are preventable with appropriate education; however some groups do not have access to information on prevention, or are unable to understand and appreciate the seriousness of the condition due to the existence of structural barriers. Interestingly, the incidence of ESKD occurs in individuals who over-consume as a lifestyle choice as well as those who suffer from poor nutrition and disadvantage. Thus, ESKD is prevalent among patients in both high and low socioeconomic groups.

In the case of dialysis it is apparent that certain modalities are dominated by particular patient groups. By taking the costing information from Table 1 and combining it with the following analysis it becomes apparent how these groups will be affected by any moves to increase the numbers on home dialysis relative to those receiving hospital dialysis. Figure 3 shows a comparison of the number of patients on home dialysis (aggregated modalities), with those on hospital dialysis (aggregated modalities and locations) as at 31 December 2008 by age group.

⁵ Patients with ESKD often present with co-morbidities such as diabetes mellitus, ischemic heart disease and cancer.

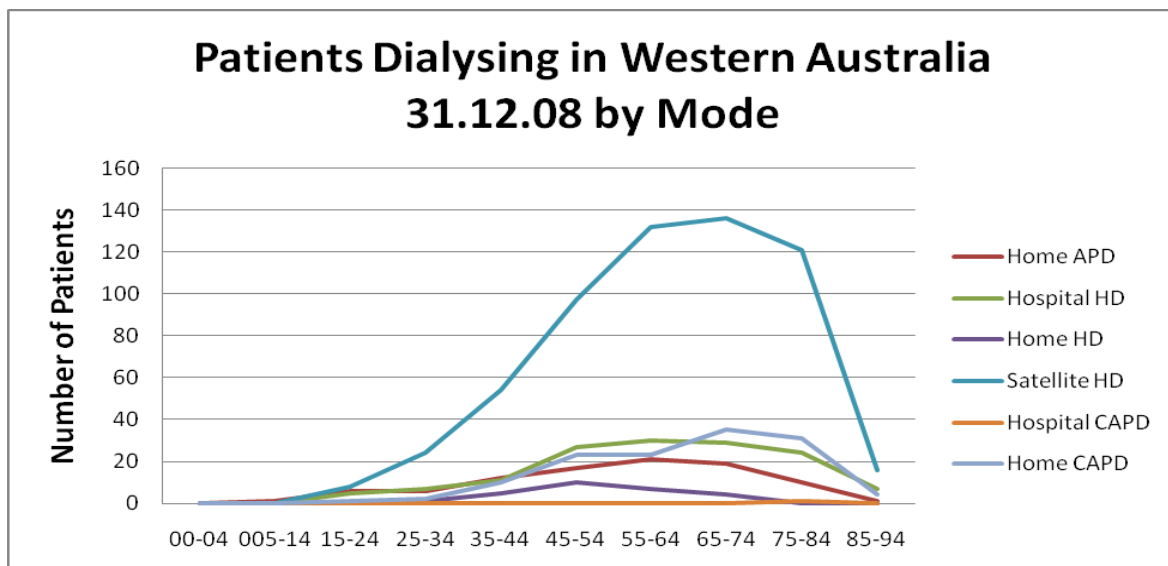
Fig 3

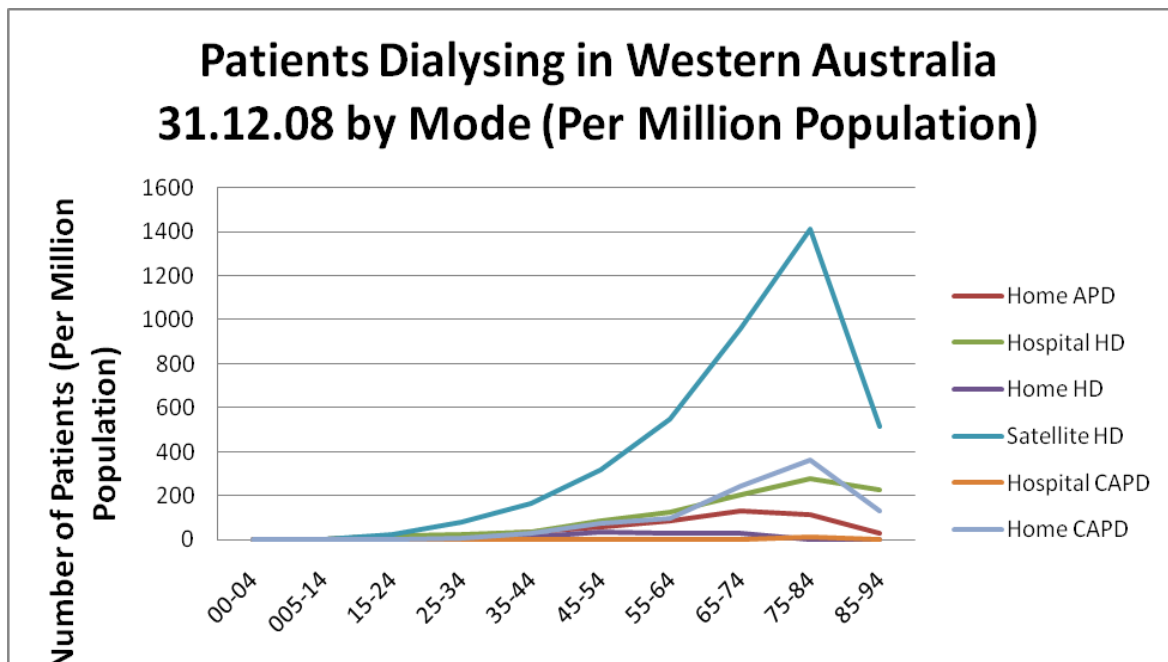


Source: Australia and New Zealand Dialysis and Transplant Registry, Appendix 1, 2009.

From Figure 3 there is an obvious distinction in the numbers attending hospital or clinic for supervised treatment and those dialysing at home. The dominant age groups for both patient groups occur between the ages of 35 and 84. There does not, therefore, appear to be any significant difference in the age structure between the two dialysis locations taken in aggregate. The age structure alters slightly when modalities are disaggregated as in Figure 4.

Fig. 4

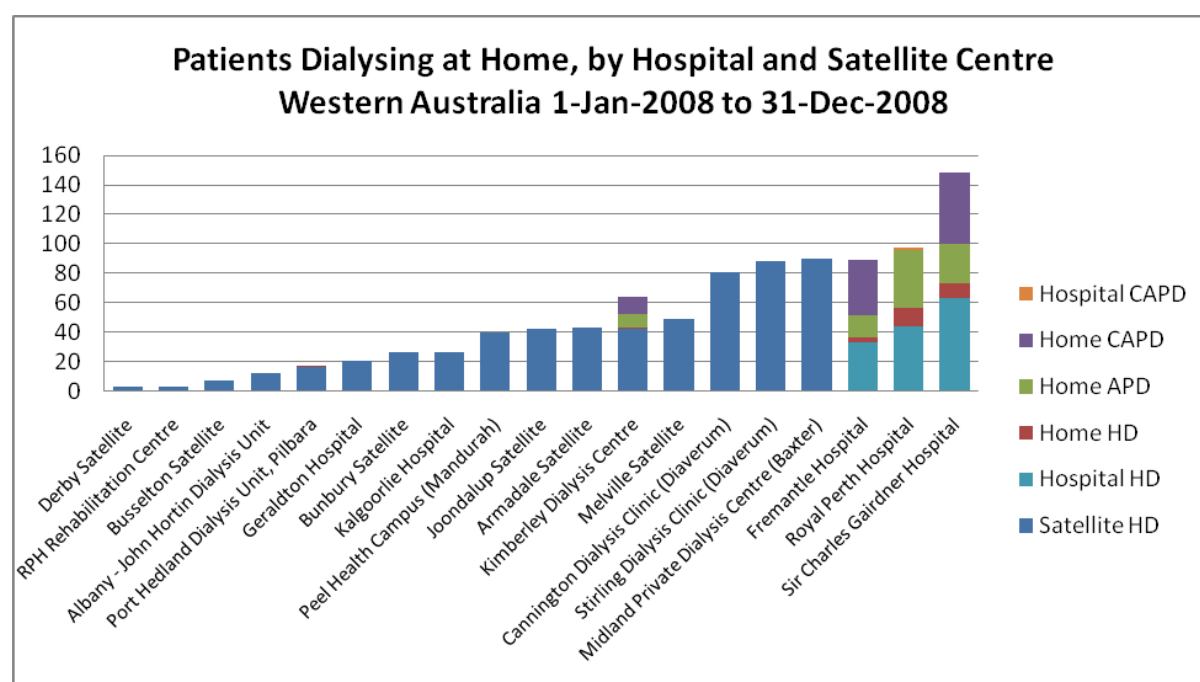




Source: Australia and New Zealand Dialysis and Transplant Registry, Appendix 1, 2009.

There are a number of observations that can be made from Figure 4. In terms of age structure (for numbers and numbers per million) there is a difference between hospital HD and home CAPD, with older patients (65-84 years) dominating in the home, and younger patients (45-64 years) dominating in teaching hospitals. The most obvious issue from Figure 4 is that the vast majority of patients dialysing use satellite HD services (60% from Fig. 2), and these are dominated by age groups between 25 and 84 years. In terms of reducing expenditure, therefore, it would appear then that the area with the greatest scope to generate the greatest savings is with a reduction in satellite HD numbers. Savings would occur if patients on satellite HD were to be placed on home dialysis, with APD and CAPD adopted for the younger and older age groups respectively. Unfortunately the situation is complicated by the fact that there is a significant difference in the capabilities of patients to undertake unsupervised home dialysis. These capability differences are taken into account when deciding on clinical suitability of the patient for the various modes. Separate patient numbers are presented in Figure 5 by mode for each of the satellite centres and three teaching hospitals in Western Australia in 2008.

Fig. 5



Source: *Australia and New Zealand Dialysis and Transplant Registry, Appendix 1, 2009.*

From Figure 5 it is clear that satellite HD centres provide the bulk of HD. The Port Hedland Dialysis Unit and the Kimberley Dialysis Centre each referred one patient for home HD (red area). None of the other satellite centres referred patients for home HD. The Kimberley Dialysis Centre also referred 9 patients for home APD and 12 patients for home CAPD. The three teaching hospitals, on the far right, are responsible for delivering some HD with more than 50%⁶ of their respective renal patients in 2008 being referred for home dialysis. These patients do not attend hospital for treatment, but attend monthly checks with nurses employed by the private provider of home dialysis⁷. Among other things, these checks may detect peritonitis in the early stages requiring treatment with antibiotics or, if the condition is more advanced, hospitalisation. Though home dialysis patients do not impose a burden on hospital resources for the purpose of obtaining dialysis treatment, they may require hospitalisation from time to time in relation to PD peritonitis or treatment arising from co-morbidities such as for example ischemic heart disease. In such cases access to PD during inpatient hospital stay is hindered by the fact that the critical mass of these skills and resources are privatised, and are no longer easily available in-house at teaching hospitals. Thus, growth in the numbers of home dialysis patients may increase the burden on hospitals

⁶ Percentage of renal patients referred for home dialysis: 63% at Fremantle Hospital, 53.5% at Royal Perth Hospital, and 57.4% at Sir Charles Gairdner Hospital.

⁷ Fresenius Medical Care also known as Home Therapies.

for associated treatment, also increasing the burden on hospitals to provide PD treatment for these patients who become inpatients.

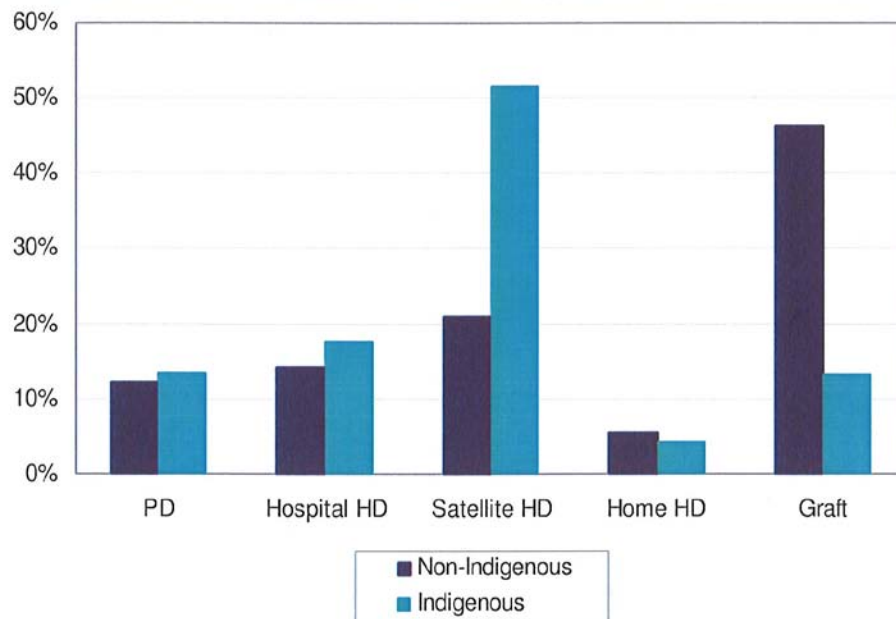
Cass et al., 2006 report on the economic impact of ESKD in Australia for Kidney Health Australia. Among their findings the authors highlight differences in ESKD incidence for indigenous⁸ and non-indigenous patients. In Western Australia and the Northern Territory, for example, they note that the incidence of ESKD in the indigenous population is 30 times that of non-indigenous. Furthermore, they note that in 2004 10% of all new RRT patients were indigenous, though this group comprises 2.4% of the Australian population (Cass et al., 2006, p 60). The authors offer reasons for this overrepresentation to be due to higher traditional risk factors such as diabetes, hypertension, poor nutrition, higher smoking rates, alcohol abuse and streptococcal skin and throat infections. The authors also note that the rate of ESKD is influenced by social and economic disadvantage arising from poor education levels, high unemployment, low incomes, house crowding and relatively high proportion of births less than 2500g.

Australia-wide figures show the breakdown of indigenous and non-indigenous RRT patients by treatment modality. Figure 6 shows that there is an overrepresentation of indigenous patients receiving satellite HD and an underrepresentation of indigenous patients who receive a functioning graft (transplant). The costs outlined in Table 1 clearly show that over time transplants are less costly to the health system. A superficial glance at Figure 6 therefore leads to the conclusion that providing indigenous patients, who are currently receiving satellite HD treatment, with functioning transplants would reduce costs. The medical literature bears out that transplants have higher survival rates [Cass et al. (2004), Irish (2008)] and therefore an increase in transplants would also improve quality outcomes for indigenous patients.

⁸ Aboriginal and Torres Strait Islanders (ATSI).

Fig. 6

Figure 33: Treatment modality utilisation by Indigenous and non-Indigenous RRT patients in Australia, at 31 December 2004 (Source: ANZDATA, special data request, 2005)



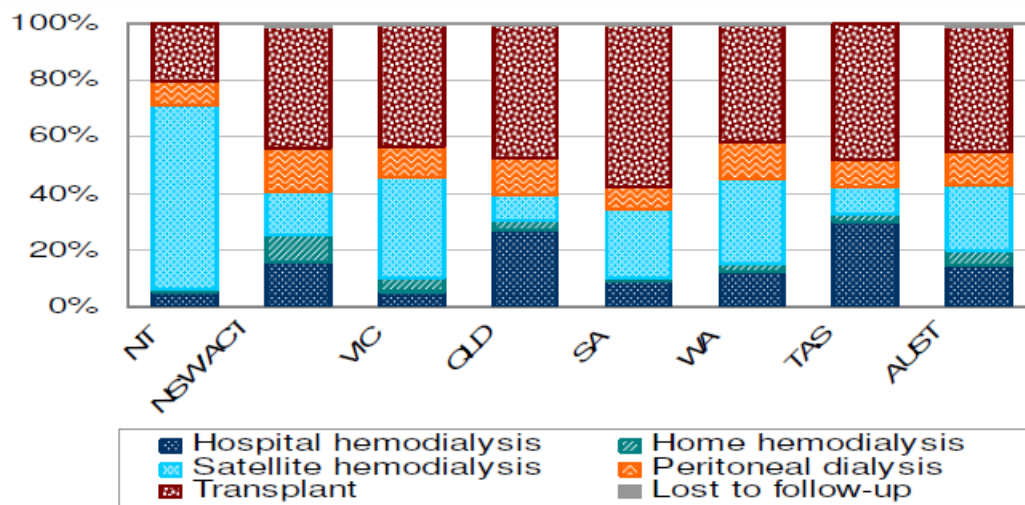
Source: Cass, et al., 2006, p 64

Figure 7 data shows that there also exists variation in modality utilisation by the States. As at December 2004 the Northern Territory had the highest percentage of satellite HD and the smallest percentage of transplants. Western Australia had the second lowest proportion of transplants and relatively low levels of hospital HD. This would indicate that the existence of a relatively large indigenous population located in remote areas leads to increased use of satellite HD and lower levels of transplants. Furthermore, Cass et al., 2001 find significant regional variation in the incidence of ESKD in the indigenous population, with the highest incidence per million per year occurring in central Western Australia and the Northern Territory. The northern and north coastal regions of Western Australia experience the second highest incidence per million per year, and the southwest corner the next highest. This regional variation suggests that remoteness is related to susceptibility of disease, leading to the conclusion that political and economic factors have conspired to produce structural barriers⁹ preventing indigenous Australians from living healthy lives.

⁹ Refer to the discussion on social epidemiology, and political economy of health, in Krieger, 2001.

Fig. 7

Figure 16: Distribution of treatment modality utilisation by prevalent RRT patients at 31 Dec 2004, by state (Source: ANZDATA, special data request, 2005)



Source: Cass, et al., 2006, p 26

Imminent Issues for Indigenous and Non-indigenous Alike

The intention to reduce the burden on hospital resources by increasing the number of dialysis patients on home dialysis does not consider the effects of a probable increase in PD peritonitis. In the case of indigenous patients it has been shown that in Western Australia aboriginals are at higher risk of PD peritonitis of both bacterial and fungal strains (Kan et al., 2003). Strict protocols for the maintenance and sterilisation of the PD catheter and its exit site must be adhered to in order to prevent infection. However, insistence of these protocols may be unrealistic in remote areas in particular, given poor access to clean drinking water and poor living conditions in general.

In cases where infection is detected early, patients are prescribed appropriate antibiotics taken both orally and combined with dialysis solution to disinfect the catheter and treat the infection directly at the peritoneum. Renal nurses are required to instruct primary care physicians (the patient's GP) on the correct antibiotic prescriptions required, and these are then supplied to the patient. Increased probability of infection therefore increases the burden on primary caregivers as well as the burden on the pharmaceutical benefits scheme (PBS).

All patients with a severe case of peritonitis must be treated as inpatients in hospital, thus increasing the demand for hospital beds. The privatisation of home dialysis has resulted in the removal of the critical mass of skills and resources from public teaching hospitals that

were previously equipped with both HD and PD treatment facilities. During a hospital stay HD patients receive HD in the renal ward, however the PD patient may be required to undertake their own dialysis or, if available, do so with the aid of a family member or carer. Over time technological improvements in the PD area will exacerbate this knowledge-gap, leaving public sector hospitals unable to facilitate crucial dialysis treatment of inpatients requiring routine PD. The existence of co-morbidities also increases the PD patient's probability of requiring hospitalisation for treatment from time to time. Thus admittance to hospital for any reason (infection notwithstanding) will increase the burden on hospitals to provide facilities for PD treatment in-house especially, but not limited to, when the patient is unconscious for lengthy periods.

In the case of an angioplasty procedure undertaken periodically to treat patients with heart disease (a common co-morbidity), the patient is hospitalised at least overnight whilst they recover. During the procedure a cardiologist uses contrast¹⁰ to illuminate arteries and locate blockages in order to insert stents and re-establish the flow of blood. Where the patient has kidney failure, the contrast must be swiftly removed from the bloodstream with dialysis. Following an angioplasty the patient recovers in a semi-conscious state and is not able to perform dialysis for themselves. Difficulties arise for patients following this procedure where in-house PD facilities are nonexistent or limited due to haphazard delivery.

Of the different types of home dialysis currently available, clearly the most easily implemented in remote areas is CAPD since it does not require either a reliable power supply or substantial high tech equipment installation, as in the case of APD and home HD respectively. The expectation that any patients transfer from satellite HD to CAPD is problematic because the fistula technology used for HD cannot be transferred to PD. In order for PD to occur, a catheter must be implanted surgically, leading to an aggregate once off increase in demand for hospital resources, and a two month delay in commencement of dialysis to enable healing. The issue of medical suitability for the patient is undoubtedly the most important consideration in the decision to convert patients from HD to PD. Tied closely to this is the degree of patient ability to adhere to protocols unsupervised by clinical staff, and this will vary among the population. Although extensive and thorough training is provided by renal nurses to all new patients and/or their carers, it is probable that the trainee's level of education and self-confidence will impact considerably on their ability to focus and absorb this knowledge.

¹⁰ A diagnostic aid called an angiogram, which also uses contrast to illuminate arteries, is commonly required prior to an angioplasty.

The author's experience of PD is limited to receiving training for administering PD as carer to an elderly relative. Over the course of 2 years a good working knowledge and experience was gained in the use of both CAPD and APD. Whilst the assistance provided by staff of the private provider was always with the best of intentions, it was not uncommon to experience delays in communicating by telephone with help-desk staff¹¹ over weekends and public holidays in particular. Use of the APD technology is made easier if the user possesses some computer skills, although the touch-screen is user-friendly. A working understanding of APD technology also includes an appreciation of the difficulties that arise in the course of nightly dialysis. Since the patient is asleep for the most part during treatment it is not uncommon for tubes, or lines as they are called, connected to the catheter to become kinked, triggering the machine to alarm during the night. Although these issues can be rectified by silencing the alarm and straightening out the lines as required, there are instances where fibrosis has developed inside the peritoneum, blocking the internal catheter. If the fibrosis can be dislodged with the flow of fluid then the treatment continues undisturbed. However suspicions of fibrosis should be addressed by attending on the renal nurse¹² at their clinic so that the fibrosis can be dislodged by the nurse using a fluid filled syringe to flush out the catheter. Failure to address this possible cause, results in continued alarms and sleep deprivation of patient and carer.

Concluding Remarks

Whilst the objective to reduce costs and pressure on the WA health system is desirable, it is not clear that the best way to bring this about is by increasing the number of patients on home dialysis. Over time transplants compare favourably to home dialysis in terms of lowering costs to the health system. Transplants are also shown to provide increased average survival years over and above different modes of dialysis. Available data shows that a significant proportion of satellite HD patients are indigenous people living in rural or remote areas. Despite this, the numbers of transplant recipients in Australia are dominated by non-indigenous patients. Providing indigenous patients, or at least a larger proportion, with functioning transplants, therefore, will achieve both a reduction in costs and an improvement in patient outcomes in terms of increased years of survival. Expecting more indigenous and non-indigenous patients to undertake their own CAPD unsupervised increases the risk of PD peritonitis, potentially increasing hospitalisation rates or reducing years of survival.

¹¹ Staff are located in the Eastern States of Australia.

¹² Access to a renal nurse employed by the private provider is essential; otherwise help can be obtained from renal staff at the referring teaching hospital. Remote patients would most likely experience significant difficulties in regard to nurse access.

Furthermore, the privatisation of home dialysis staff and consumables has divided treatment regimes for dialysis patients. PD patients requiring hospitalisation for any reason, but more likely admitted to receive treatment for ESKD co-morbidities, are disadvantaged due to removal of the critical mass of knowledge and resources for PD. Admission to a teaching hospital no longer guarantees the existence of renal staff with up-to-date knowledge of PD technology. Over time improvements to PD technology will exacerbate this knowledge-gap. An increase in PD numbers will increase this disadvantage.

The most concerning of these issues, however, is privatisation and the advent of monopoly power in home dialysis treatment. This change signals an internal market whereby an increase in home dialysis numbers increases monopoly profits in an area of healthcare which is seen to have a social product nature and which is funded by taxpayers through Medicare.

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